Patent Claims

1. A drive unit, particularly of a vehicle, with a cooling circuit, comprising

1.1 a hydrodynamic retarder (100) containing a rotor blade wheel (11) and a stator blade wheel (12), wherein

1.2 the hydrodynamic retarder (100) is arranged in the cooling circuit and the working medium of the retarder (100) is the cooling medium, characterized in that

1.3 the retarder (100) comprises means, in non-braking operation, of emptying a quantity of residual fluid against the external pressure built up by the cooling system.

2. The drive unit according to claim 1, further characterized in that the means for emptying are means for aspirating the quantity of residual fluid out of the retarder.

3. The drive unit according to claim 1 or 2, further characterized in that the means for emptying comprise a least one cylinder (30, 40), which is connected with the cooling circuit (120) and/or the retarder (100) via lines (32, 33, 41, 42).

4. The drive unit according to one of claims 1 to 3, further characterized in that the cylinder (30, 40) is attached via a line (32, 42) to the point of highest pressure in the cooling system (120).

5. The drive unit according to one of claims 1 to 4, further characterized in that a throttle (43), particularly a controllable throttle, is arranged in the line (32, 42) from the cylinder (30, 40) to the point of highest pressure.

6. The drive unit according to one of claims 1 to 3, further characterized in that the means for emptying further comprise a switchable valve (31).

7. The drive unit according to one of claims 1 to 6, further characterized in that the cylinder is connected via a line (41) to the cooling circuit (120) at the point of lowest pressure in the cooling circuit.

8. The drive unit according to claims 7 and 4, further characterized in that the line (42), which is connected at the point of highest pressure in the cooling system (120), and the line (41), which is connected at the point of lowest pressure in the cooling circuit (120), are connected at opposite-lying sides of a piston (37) at the cylinder (40) and in that the piston (37) is placed under pressure by a pressure spring (36), which presses the piston (37) in opposition to the pressure supplied through the line (41).

9. The drive unit according to one of claims 1 to 7, further characterized in that a pressure relief line (64, 65) containing a pressure shut-off valve (62) is connected to the cooling circuit (120) and/or the retarder (100), the pressure shut-off valve (62) being introduced in a controlled manner into the pressure relief line (64, 65) in such a way that it opens during transition of the retarder from braking operation to non-braking operation.

10. The drive unit according to claim 9, further characterized in that the pressure relief line (65, 65)[1] is connected at one end to a point of low pressure in flow direction in braking operation in front of the retarder (100) and at its other end to a point of high pressure at the retarder (100) or behind the retarder (100), the pressure at the point of low pressure amounting, in particular, to a maximum of 2

[1] [Translator's Note] Typograhpical error. "64, 65" is presumably intended.

bars and the pressure at the point of high pressure amounting, in particular, to between 11 bars and 30 bars.

11. The drive unit according to one of claims 1 to 10, further characterized in that the drive unit has a motor (1) and a transmission and the retarder (100) is a secondary retarder that is arranged in power flow direction behind the transmission.

12. The drive unit according to one of claims 1 to 11, further characterized in that the means for emptying the quantity of residual fluid comprise a cylinder (40) having a piston (37), to which a first high pressure is applied on one side by means of a line (42) that is attached in flow direction behind the retarder (100) at a point of high pressure in the retarder structural member in the cooling circuit, and to which a second low pressure is applied on its opposite-lying side by means of a line (41) that is connected in flow direction in front of the retarder at a point of low pressure in the retarder structural member on the cooling circuit.

13. The drive unit according to claim 12, further characterized in that a throttle (43) is placed in the line (42).

14. The drive unit according to one of claims 11 to 13, further characterized in that the retarder structural member additionally has a pressure shut-off valve (62) in a pressure relief line (64, 65), the pressure relief line (64, 65) being connected at one end in flow direction behind the retarder or to the retarder (100) at a point of high pressure and at its other end in the flow direction in front of the retarder (100) at a point of low pressure of the cooling circuit.

15. The drive unit according to claims 13 and 14, further characterized in that the line (42) is connected at its end lying opposite the cylinder (40) to a control

valve (17) and that the drive unit additionally has a change-over valve (13) in flow direction behind a connection (71) for feeding cooling medium into the retarder and in front of the retarder (100), which is constructed in such a way that, in predetermined switching positions, it diverts cooling medium through the retarder (100) or through a bypass (66) around the retarder, and in that the control valve (17), the pressure shut-off valve (62), and the change-over valve (13) are switched or controlled by application of pressure.

16. The drive unit according to one of claims 11 to 15, further characterized in that the retarder (100) has a single connection (71) for introducing cooling medium and a single connection (72) for carrying away cooling medium.

17. The drive unit according to one of claims 15 or 16, further characterized in that the control valve (17) and the change-over valve (13) are designed to be completely sealed in the direction of the retarder in the predetermined switching directions in which the cooling medium is diverted through the bypass (66) around the retarder.